Use on all urban and rural projects with the following bid items:

320.0100 - 0199	Concrete Base (Inch)
320.0300 - 0399	Concrete Base HES (Inch)
320.0500	Concrete Base Widening
415.0060 - 0199	Concrete Pavement (Inch)
415.1080 - 1199	Concrete Pavement HES (Inch)
416.0050	Concrete Pavement Approach Slab
416.0055	Concrete Pavement Approach Slab HES
416.0310	Concrete Alley
416.0315	Concrete Alley HES
416.0410	Concrete Pavement Header
416.0415	Concrete Pavement Header HES
416.0805	Concrete Pavement Gaps

415-065

QMP Concrete Pavement; Incentive Strength Concrete Pavement, Item 415.2000.S.

A Description

A.1 General

(1) Conform to standard spec 320, 415, 416, and 501 as modified in this special provision. Apply this special provision only to the following bid items:

320.0100 - 0199	Concrete Base (inch)
320.0300 - 0399	Concrete Base HES (inch)
320.0500	Concrete Base Widening
415.0060 - 0199	Concrete Pavement (inch)
415.1080 - 1199	Concrete Pavement HES (inch)
416.0050	Concrete Pavement Approach Slab
416.0055	Concrete Pavement Approach Slab HES
416.0310	Concrete Alley
416.0315	Concrete Alley HES
416.0410	Concrete Pavement Header
416.0415	Concrete Pavement Header HES
416.0805	Concrete Pavement Gaps

(2) Provide and maintain a quality control program, defined as all activities and documentation of the following:

1. Mix design.
2. Production control, placement control, and inspection.
3. Sampling, testing, measurement, and correction of materials and in-place concrete pavement.

(3) Chapter 4 of the department's construction and materials manual (CMM) provides additional detailed guidance for QMP work and describes required sampling and testing procedures. The contractor may obtain the CMM from the department's web site at:
http://roadwaystandards.dot.wi.gov/standards/cmm/index.htm

(4) The department's Materials Reporting System (MRS) software allows contractors to submit data to the department electronically, estimate pay adjustments, and print selected reports. Qualified personnel may obtain MRS software from the department's web site at:

http://www.atwoodsystems.com/mrs

A.2 Contractor Testing for Small Quantities

(1) The department defines a small quantity, for a particular mix design and placement method, as less than 2500 cubic yards (1912 m^3) for slip-formed work or 1000 cubic yards (765 m^3) work not slip-formed.

(2) The requirements under this special provision apply equally to a small quantity for a particular mix design and placement method, except as follows:

1. The contractor need not submit a full quality control plan but shall provide an organizational chart to the engineer including names, telephone numbers and current certifications of all persons involved in the quality control program.
2. The engineer may accept aggregate gradation based upon satisfactory records of previous testing.
3. No concrete control charts are required. Submit test results to the engineer each day as they become available. Assure that all properties are within the limits specified in the standard specifications for each sublot tested.
4. The department will not adjust the pay for sublots with conforming compressive strength.

B Materials

B.1 Quality Control Plan

(1) Submit a comprehensive written quality control plan. Construct the project as the plan provides. Submit the plan to the engineer no later than 10 business days before placing concrete pavement. Do not change the quality control plan without the engineer's review. Update the plan with changes as they become effective. Provide a current copy of the plan to the engineer and post in each of the contractor's laboratories before producing concrete and as changes are adopted. Ensure that the plan provides the following elements:

1. An organizational chart including names, telephone numbers, current certifications and/or titles, and roles and responsibilities of all quality control personnel.
2. The process by which quality control information and corrective action efforts will be disseminated to the appropriate persons. Include a list of recipients, the communication means that will be used, and action time frames.
3. Preliminary concrete pavement mix information including anticipated producers, manufacturers, and sources of mix materials, and the name, title, and phone number of the person responsible for developing the mix design.
4. The locations of the QC laboratories for mix design, aggregate testing, cylinder curing, concrete testing, and compressive strength testing.
5. Anticipated concrete mix aggregate gradations and limits.
6. The initial and routine equipment checks and documentation performed on scales, and water meters.

7. The methods for monitoring and recording the materials used in each batch.
8. Procedures for documenting the locations of yielding base course and subgrade.
9. The frequency of contractor quality control testing, if planning to perform more frequently than section B.7 specifies.
10. The format for control charts and sampling, testing, and pay adjustment data documentation, if different from the forms provided in the CMM 4-15-42.

B.2 Personnel

(1) Perform the material sampling, testing, and documentation required under this provision using HTCP certified technicians. Have a PCC technician certified under HTCP at level I present at the project site, prepared and equipped to perform required sampling and testing, whenever placing concrete.

B.3 Laboratory

(1) Perform the concrete mix design, aggregate testing, cylinder curing, and compressive strength testing at a department-qualified laboratory. Obtain information on the Wisconsin laboratory qualification program from:

Materials Management Section
3502 Kinsman Blvd.
Madison Wisconsin 53704
Telephone: 608-246-5388
http://www.dot.state.wi.us/business/engrserv/lab-qualification.htm

B.4 Equipment

(1) Furnish the necessary equipment and supplies for performing quality control testing. The engineer may inspect the measuring and testing devices to confirm both calibration and condition. Calibrate all testing equipment according to the CMM 4-15-12 and maintain a calibration record at the laboratory.

B.5 Concrete Pavement Mixes

B.5.1 General

(1) Determine concrete pavement mixes for the project. Have a PCC technician certified under HTCP at level II develop contractor-supplied pavement mixes. Test concrete during mix development at a department-qualified laboratory.

(2) At least 3 business days before producing concrete, submit to the engineer 2 copies of a concrete pavement mix report. Include signature blocks for both the contractor's mix developer and the department's project engineer on the mix report cover sheet. Before the engineer’s review, have the mix developer sign and date each copy attesting that all information in the report is accurate and true. The engineer will review, comment, sign, and date each copy of the report. The engineer’s signature will verify that the engineer had the opportunity to review the mix report, to check that it meets the concrete mix requirements, and to comment. The engineer will keep one original signed copy and return the other copy to the contractor within 3 business days of receiving the report.

B.5.2 Concrete Mix Design

B.5.2.1 General

(1) For concrete base, use a grade B, B-FA, B-S, B-IS, or B-IP concrete mix conforming to standard spec 501. The contractor may substitute aggregate conforming to the gradation requirements of a contractor-developed pavement mix design approved under the contract.

B.5.2.2 Standard Specification Concrete Mix

(1) Replace the word "engineer" with the word "contractor" in standard spec 501.3.2.1. and 501.3.2.3.

(2) The contractor may elect to use concrete pavement mixes from standard spec 501. When choosing this alternate, the contractor is responsible for mix performance just as if the contractor provided independent mix designs.

(3) Provide mix documentation ensuring that all materials conform to standard spec 501 unless the engineer waives specific requirements. Ensure that the mix limits, including aggregate gradations, are within the master limits listed in standard spec 501.3.2.2. Include documentation for the original mix designs as follows:

1. Mix: quantities per cubic yard expressed as SSD weights and net water, water to cementitious material ratio, air content.
2. Materials: type, brand, and source.
3. Aggregates: absorption, specific gravities, wear, soundness, freeze thaw test results if required, air correction factor, and proposed gradation control limits.

B.5.2.3 Contractor Concrete Mix Design

(1) Delete standard spec 501.2.5.3.4, 501.2.5.4.4, 501.3.1.1.2, 5013.2.1, 501.3.2.2, and 501.3.2.3. Delete the maximum limit for percent passing the No. 200 (75 μm) sieve from standard spec 501.2.5.3.1 and 501.2.5.4.2.

B.5.2.3.1 Documentation

(1) Provide mix design documentation ensuring that all materials conform to standard spec 501.2, as modified in this special provision, unless the engineer waives specific requirements. Include documentation for contractor mix designs as follows:

1. Mix development: test dates, the name and location of the laboratory used to develop the mix design.
2. Mix: quantities per cubic yard expressed as SSD weights and net water, water to cementitious material ratio, air content, and 28-day or earlier compressive strength.
3. Materials: type, brand, and source.
4. Aggregates: absorption, specific gravities, wear, soundness, freeze thaw test results if required, air correction factor, and proposed gradation control limits.

B.5.2.3.2 Concrete Mix Physical Requirements

(1) Use at least 5 pairs of cylinders to demonstrate the compressive strength of a mix design. The contractor may report strengths from either laboratory testing or previous field test data for a similar mix design. Demonstrate that the 28-day compressive strength of the

proposed mix will equal or exceed the 85 percent within the limits criterion specified in E.3. The contractor need not provide separate laboratory mix designs and compressive strength tests for high early strength concrete.

(2) Provide a minimum cement content of 565 pounds per cubic yard (335 kg/m3), except if using type I or III cement in a mix where the geologic composition of the coarse aggregate is primarily igneous or metamorphic materials, provide a minimum cement content of 660 pounds per cubic yard (392 kg/m3). The contractor may partially replace Portland cement with fly ash at a replacement ratio of not less than one pound (kg) of fly ash per one pound (kg) of cement up to a maximum fly ash content of 30% of total cementitious material. Alternatively, the contractor may use slag as a partial replacement for cement at a replacement ratio of not less than one pound (kg) of slag per one pound (kg) of cement. For slip-formed concrete pavement do not exceed a maximum slag content of 50% of the total cementitious material. For concrete pavement not slip-formed, do not exceed a maximum slag content of 30% of total cementitious material. Alternatively, the contractor may use a combination of fly ash and slag up to a maximum combined fly ash and slag content of 30 percent. Ensure that fly ash conforms to standard spec 501.2.6 and slag conforms to standard spec 501.2.7.

(3) The target ratio of net water to cementitious material (W/Cm) for the submitted mix design shall not exceed 0.42 by weight. Net water includes free water on the aggregate surface but does not include water absorbed within the aggregate particles.

(4) Ensure that the combined aggregate gradation conforms to the following, expressed as weight percentages of the total aggregate:

1. One hundred percent passes the 2 inch (50 mm) sieve.
2. The percent passing the No. 4 (4.75 mm) sieve is less than or equal to 42, except if the coarse aggregate is completely composed of crushed stone and/or recycled concrete, up to 47 percent may pass the No. 4 (4.75 mm) sieve.
3. The percent passing the No. 200 (75 µm) sieve is less than or equal to 2.3 percent.

(5) Do not use chloride based accelerators in mixes for all new construction.

(6) The contractor may adjust admixture dosages without providing a new mix design.

B.5.3 Mix Changes

(1) Prepare and submit modifications to a standard specification concrete mix or a contractor concrete mix design to the engineer for review before using that mix. Modifications requiring the engineer's review include changes in:

1. The source of any material.
2. The amounts of cementitious materials.
3. The adjustment of fine to total aggregate greater than ±3 percent by weight.
4. The addition or deletion of admixtures.

(2) When the department requires or allows high early strength concrete, use type III cement. Alternatively the contractor may add a minimum of an additional 95 pounds of cement per cubic yard of concrete (57 kg cement/m3 concrete) to a previously accepted mix.

B.6 Quality Control Documentation

B.6.1 Control Charts

(1) Maintain control charts when required by the test reporting procedures. Ensure that all tests are recorded and become part of the project records. Plot required test results on the control charts. Include random, non-random, and engineer requested testing but only include the contractor's randomly selected QC test results in the 4-point running average. The contractor may plot other contractor-performed process control or informational tests on the control charts, but do not include them in 4-point running averages.

(2) Post control charts in an engineer-approved location and update daily. Ensure that the control charts include the project number, the test number, each test element, the applicable warning and control limits, the contractor's individual test results, the running average of the last 4 data points, and the engineer's verification and independent assurance test data points. Use the control charts as part of a process control system for identifying potential problems and assignable causes. Format control charts according to CMM 4-15-12.

(3) Submit control charts to the engineer in a neat and orderly manner within 10 days after completing concrete production..

B.6.2 Records

(1) Document all observations, inspection records, mix adjustments, and test daily. Submit test results to the department electronically using the MRS software. Complete all required data entry fields. Record other test results using the forms provided in CMM 4-15-42. Note other information in a permanent field record and, if appropriate, plot on control charts.

(2) Submit original testing records to the engineer in a neat and orderly manner within 10 days after completing concrete production.

B.7 Contractor Testing

B.7.1 General

(1) Perform all quality control tests necessary to control the production and construction processes applicable to this special provision and as described in the quality control plan. Use the test methods identified below, or other methods the engineer approves, to perform the following tests:

Aggregate gradations ..... AASHTO T-11[1] & T-27[1]
Aggregate materials finer than the No. 200 sieve ..... AASHTO T 11[1]
Aggregate moisture ..... AASHTO T 255[1]
Air content ..... AASHTO T 152[2]
Slump ..... AASHTO T 119[2]
Temperature ..... AASHTO T 309

Compressive strength..... AASHTO T 22, T 23, T 141, M 201

[1] As modified in CMM 4-25-50.

[2] As modified in CMM 4-25-70.

(2) The department may periodically observe contractor sampling and testing, and direct additional contractor sampling and testing for department evaluation. Ensure that all test results are available for the engineer's review at any time during normal working hours.

B.7.2 Aggregate Gradation

B.7.2.1 Sampling and Testing

(1) Randomly sample and test the individual aggregate gradations according to AASHTO T 11 and AASHTO T 27 as modified by the department. Have an HTCP certified aggregate sampling technician or aggregate technician IPP perform all sampling. Have an HTCP certified aggregate technician IPP test the aggregate and document the results.

(2) Test during aggregate production as follows:

Daily Aggregate Production, Rate in tons or Mg	Minimum Testing Frequency for Each Aggregate Stockpile
≤1000	One test per cumulative total of 1000 tons or Mg; or a minimum of one test per 5 days of aggregate production
>1000 - ≤2000	2 tests per day
>2000+	3 tests per day

(3) If the aggregate was produced before the contract and production records are not available or not acceptable to the engineer, sample and test during concrete production at a frequency greater than or equal to the following:

Daily Concrete Production in cubic yards (m^3)	Minimum Testing Frequency for Each Aggregate Stockpile
≤250 (200)	One test per cumulative total of 250 cy (200 m^3) or a minimum of one test per 5 days of concrete production
>250 (200) - ≤1000 (750)	One test per day
>1000 (750)	2 tests per day

(4) Ensure that only results of randomly selected QC tests are included in the 4-point running average.

(5) Use control limits for sieve sizes as identified by the contractor in the project concrete mix report or, if the concrete mix report is not published at the time of testing, in the contractor's quality control plan. Gradation warning limits are inside the upper and lower control limit values by one percentage point for all sieves except as follows:

1. The upper warning limits for percent passing the No. 100 (150 µm) and No. 200 (75 µm) sieves are inside the control limit by 0.5 percent.

2. For sieves allowing 100 percent passing, there is no upper warning limit. For sieves with 0 percent passing, there is no lower warning limit.

(6) Wash each sample of fine aggregate and the first 4 samples of each of the coarse aggregates. If the percent passing the No. 200 (75 µm) sieve for the combined gradation is less than the warning limit, wash at least every 10th sample of each of the coarse aggregates. If the percent passing the No. 200 (75 µm) sieve for the combined gradation is greater than or equal to the warning limit, wash each sample of the coarse aggregate until 4 consecutive tests are less than the warning limit.

B.7.2.2 Documentation

(1) Maintain control charts at the laboratory for each aggregate stockpile. Maintain a chart for each control sieve for each material. Record contractor test results the same day tests are conducted.

B.7.2.3 Corrective Action

(1) When the 4-point running average value approaches a warning limit, consider corrective action. Ensure that any corrective action is documented and becomes part of the project records.

(2) Document whenever a 4-point running average exceeds the warning limits. When a second consecutive running average value exceeds the warning limits, take corrective action. Continue corrective action until 2 consecutive average points are within the warning limits.

(3) Notify the engineer whenever an individual test value exceeds a control limit. Material is nonconforming when an individual test exceeds the control limit. The quantity of nonconforming material includes the material of the first test exceeding the control limit, continuing to but not including, the material from the first subsequent test that is within the control limits. The department may reject material or otherwise determine the final disposition of nonconforming material as specified in standard spec 106.5.

B.7.3 Aggregate Percent Passing the No. 200 Sieve

B.7.3.1 Sampling and Testing

(1) Have an HTCP certified aggregate sampling technician or aggregate technician IPP perform all sampling. Have an HTCP certified aggregate technician IPP test the aggregate and document the results.

(2) Measure and record the percent passing the No. 200 (75 µm) sieve of both the fine and course aggregates when producing concrete pavement. Conduct tests according to AASHTO T 11 as modified by the department. Test at least one sample as early as it is practical each day and as mix or material conditions change. The contractor may reduce this testing frequency, if the engineer approves, but maintain at least one test per 5 days of concrete production.

(3) Document testing as specified in B.6.1, B.7.2.1, and B.7.2.2, by developing a combined gradation control chart for the percent passing the No. 200 (75 μm) sieve. Use the control limits defined in the concrete pavement mix report. Ensure that only results of QC tests are included in the 4-point running average.

B.7.3.2 Corrective Action

(1) When an individual test approaches a warning limit, consider corrective action. Document corrective actions and include that documentation in the project records.

(2) Notify the engineer if an individual test exceeds the warning limits. If a second consecutive individual test exceeds the warning limits, the engineer and contractor will determine the contractor's course of corrective action. If the corrective action improves the property in question such that additional individual tests are within the warning limits, the contractor may continue production. If the correction does not improve the property, and new individual tests stay in the warning band, repeat the steps outlined here in B.7.3.2(2) starting with notifying the engineer.

(3) Notify the engineer whenever an individual test value exceeds a control limit. Material is nonconforming when an individual test exceeds the control limit. The quantity of nonconforming material includes the material of the first test exceeding the control limit, continuing to but not including, the material from the first subsequent test that is within the control limits. The department may reject material or otherwise determine the final disposition of nonconforming material as specified in standard spec 106.5.

B.7.4 Compressive Strength

(1) The department will make pay adjustments for compressive strength on a lot-by-lot basis using the compressive strengths of contractor QC cylinders. The department will accept or reject concrete on a sublot-by-sublot basis using the compressive strengths of the contractor QC cylinders. The department will not adjust pay for concrete base or for high early strength concrete, except for concrete placed in mainline pavement gaps as specified in B.7.4.1.3. Include tests of concrete base and high early strength concrete for all other QC testing, except no 28-day cylinders are required for concrete base or for high early strength concrete.

B.7.4.1 Lot and Sublot Requirements

(1) Designate the location and size of all lots before placing concrete pavement. Ensure that no single lot contains concrete of more than one mix design, as defined in B.5, or more than one placement method, except for mainline pavement gaps as specified in B.7.4.1.3. Placement method is defined as either slip-formed or not slip-formed.

B.7.4.1.1 Mainline Travel Lanes and Mainline Shoulders

(1) Each lot is one paving pass in width and may be either one or two lanes wide.

(2) Lots and sublots may include concrete from more than one day of paving.

(3) A lot consists of a minimum of 4 sublots and a maximum of 8 sublots.

(4) A sublot is 1000 lane feet in size (1000 linear feet for one-lane paving width, 500 linear feet for two-lane paving width).

(5) Sublots at either end of a paving pass may be greater than 1000 lane feet in size to accommodate the actual project length and staging requirements. For ease of layout, begin the first sublot at the first even station of the project. Place the resulting partial quantity into the first full sublot.

(6) Lot and sublot limits shall coincide for adjacent paving passes along the project length.

(7) Align sublot limits with the segment limits used for profiling under the QMP Ride specification.

B.7.4.1.2 Non-Mainline Surfaces

(1) Non-mainline surfaces shall be defined as all concrete surfaces under this special provision, which are not mainline travel lanes or mainline shoulders.

(2) Lots and sublots may include concrete from more than one day of paving.

(3) A lot consists of a minimum of 4 sublots and a maximum of 8 sublots.

(4) All sublots within a lot shall have the same approximate size.

(5) A sublot is a maximum of 1000 square yards of concrete.

B.7.4.1.3 Mainline Pavement Gaps

(1) Concrete pavement gaps shall not affect the location of lot and sublot limits for mainline travel lanes and mainline shoulders.

(2) If a sublot random test location falls within a mainline pavement gap, relocate the test to a different location within the sublot. Obtain test results from concrete being placed by the standard placement method for that sublot.

(3) The mainline pavement gap area will be included for strength incentive and/or disincentive pay based upon the sublot test results, regardless of the mix grade or placement method used within the pavement gap.

B.7.4.2 Sampling

(1) Do not cast more than one set of cylinders from a single truckload of concrete.

(2) Have an HTCP certified PCC technician I sample, test, and document results during concrete production and placement. Cast one set of 3 standard 6X12 inch QC cylinders for each sublot using concrete delivered to the job site. Cast all sublot cylinders from the same sample. Have a certified technician determine random sublot sampling locations as

described in CMM 4-15-12. Sample according to AASHTO T 141. Cast and initially cure the cylinders according AASHTO T 23.

(3) For one sublot per lot, fabricate 3 companion cylinders from the same sample used for casting the QC cylinders. Provide all materials, fabrication, initial curing, and handling required for companion cylinders for up to 3 calendar days following fabrication.

B.7.4.3 Concrete Cylinder Curing

(1) Provide facilities for initial curing. For up to 48 hours after casting, maintain the temperature adjacent to the specimens in the range of 60 to 80 degrees F (16 - 27 degrees C) and prevent moisture loss. Between 24 and 48 hours after casting, transport the specimens to a department-qualified laboratory for standard curing according to AASHTO M 201 for 28 days.

B.7.4.4 Compressive Strength Testing

(1) Have an HTCP certified compressive strength tester, in a department-qualified laboratory, perform compressive strength testing and document the results. Randomly select 2 QC cylinders to test at 28 days for percent within limits (PWL).

(2) Determine the 28-day compressive strength in psi of each cylinder according to AASHTO T 22. Test each cylinder to failure. Use a compression machine that automatically records the date, time, rate of loading, and maximum load of each cylinder. Include a printout of this information with the compressive strength documentation for each cylinder tested.

(3) Compare the strengths of the 2 randomly selected QC cylinders and determine the 28-day sublot average strength as follows:

- If the lower strength divided by the higher strength is 0.9 or more, average the 2 QC cylinders.
- If the lower strength divided by the higher strength is less than 0.9, break one additional cylinder and average the 2 higher strength cylinders.

B.7.4.5 Removal and Replacement

(1) If a sublot strength is less than 2500 psi (17.2 MPa), the department may direct the contractor to core that sublot to determine its structural adequacy and whether to direct removal. Cut and test cores according to AASHTO T 24 as and where the engineer directs. Have an HTCP certified PCC technician I perform or observe the coring. Bear all coring and testing costs, fill all core holes with an approved grout, and provide traffic control during coring at no cost to the department.

(2) The sublot pavement is conforming if the compressive strengths of all cores from the sublot are 2500 psi (17.2 MPa) or greater or the engineer does not require coring.

(3) The sublot pavement is nonconforming if the compressive strengths of any core from the sublot is less than 2500 psi (17.2 MPa). The department may direct removal and

replacement or otherwise determine the final disposition of nonconforming material as specified in standard spec 106.5.

B.7.5 Air Content

(1) On each day of production, test air content at the point of placement at start-up and as frequently as practicable until the concrete meets the specifications and the production process is under control. Subsequently, test air content for each compressive strength sublot. Have an HTCP certified PCC technician I test air content according to AASHTO T 152, as modified by the department. Test concrete taken from the same sample used for QC strength cylinders, and as the engineer directs.

(2) The lower and upper control limits for air content are the values specified in standard spec 501.3.2.4.2. The lower warning limit for air content is 0.5 percent above the lower control limit. There is no upper warning limit.

B.7.5.1 Documentation

(1) Maintain a control chart at a fixed location on the project site. Ensure that all test results are recorded and become part of the project records. Chart all results on the same day tests are conducted. Only plot results of samples selected randomly in the 4-point running average.

(2) Document admixture dosage rates, time of day, and air temperature on the combined gradation control chart for the percent passing the No. 200 (75 µm) sieve whenever changing an admixture dosage rate.

B.7.5.2 Corrective Action

(1) If an individual air test is between the lower warning limit and lower control limit, double the air content test frequency to 2 tests per compressive strength sublot. Perform one of these tests from the same concrete sample used for the QC strength cylinders. Select the second sample randomly from the half of the sublot not used for the QC strength cylinders. Determine both random test locations within a sublot before paving that sublot. Continue testing at increased frequency until an individual test point is above the lower warning limit and below the upper control limit.

(2) When the 4-point running average value trend is towards the lower warning limit or the upper control limit, consider corrective action.

(3) Notify the engineer if a 4-point running average is less than the lower warning limit. If a second consecutive running average is below the warning limit, the engineer and contractor will determine the contractor's course of corrective action. If the corrective action improves the property in question such that the new running average, after four additional individual tests, is between the lower warning limit and upper control limit, the contractor may continue production. If the new running average is below the lower warning limit, repeat the steps outlined here in B.7.5.2(3) starting with notifying the engineer.

(4) If an individual air test is outside the control limits, notify the engineer, and perform additional air tests as often as it is practical on subsequent loads until the air content is inside the control limits. The material is nonconforming when an individual test exceeds the control limit. Material from the load with the first test exceeding the control limit, continuing to but not including the load with the first subsequent test within the control limits, is nonconforming. The department may direct removal and replacement or otherwise determine the final disposition of nonconforming material as specified in standard spec 106.5.

B.7.6 Concrete Temperature

(1) Have an HTCP certified PCC technician I measure concrete temperature according to AASHTO T 309. Test concrete taken from the same sample used for QC strength cylinders. Record concrete temperatures on the air content control chart.

B.7.7 Slump

(1) Have an HTCP certified PCC technician I measure slump according to AASHTO T 119. The contractor need not test slump for slip-form paving unless the engineer requests. For other placement methods, test slump whenever an air content test is performed or cylinders are made and as the engineer directs. Provide material conforming to the slumps specified in standard spec 415.3.6.

B.8 Department Testing

B.8.1 General

(1) The department will conduct verification testing to validate the quality of the product and independent assurance testing to evaluate the sampling and testing. The department will provide the contractor with a listing of names and telephone numbers of all verification and independent assurance personnel for the project.

(2) Except for strength, the department will provide test results to the contractor within 2 business days after the department obtains the sample.

B.8.2 Verification Testing

(1) The department will have an HTCP technician, or ACT under the direction of a certified technician, perform QV sampling and testing. Department verification testing personnel must meet the same certification level requirements specified for contractor testing personnel for each test being verified. The department will notify the contractor before sampling so the contractor can observe QV sampling.

(2) The department will sample randomly at locations independent of the contractor’s QC work. In all cases, the department will conduct the verification tests in a separate laboratory and with separate equipment from the contractor's QC tests.

(3) The department will perform verification testing as follows:

	Testing Frequency Guide[1]	Sampling Material and Location	Test Method	Alternate Test Methods
Air content	1 per lot	Plastic concrete, ahead or behind[2] the paver	AASHTO T 152 as modified	Hardened air content testing[2] after construction
28-day compressive strength	1 per 5 lots	Cylinders	AASHTO T 22, T 23 & T 141 as modified	Random cores[2] after construction

[1] The engineer may increase the frequency at start-up or as necessary to validate the quality of the materials. The engineer may reduce the frequency based on a history of satisfactory contractor or material performance.

[2] Evaluation of test results should account for systematic differences in testing methods or sampling locations.

(4) The department will conduct verification testing for pavement thickness as specified in standard spec 415.3.18.

(5) Plot verification tests on the contractor's quality control charts as specified in B.6.1. Do not include verification tests in the 4-point running average.

(6) If verification tests indicate conformance with specifications, no further action is required. If verification tests indicate nonconformance with specifications, the engineer and contractor will jointly investigate any testing discrepancies. The investigation may include additional testing as well as review and observation of both the department's and contractor's sampling and testing procedures and equipment. Both parties will document all investigative work.

(7) Correct all deficiencies. If the contractor does not respond to an engineer request to correct a deficiency or resolve a testing discrepancy, the engineer may suspend production until action is taken. Resolve disputes as specified in B.9.

B.8.3. Independent Assurance Testing

(1) Independence assurance is unbiased testing the department performs to evaluate the department's verification and the contractor's QC sampling and testing including personnel qualifications, procedures, and equipment. The department will perform the independent assurance review according to the department's independent assurance program, which may include one or more of the following:

1. Split sample testing.
2. Proficiency sample testing.
3. Witnessing sampling and testing.
4. Test equipment calibration checks.
5. Reviewing required worksheets and control charts.
6. Requesting that testing personnel perform additional sampling and testing.

(2) Plot the independent assurance tests on the contractor's quality control charts as specified in B.6.1. Do not include independent assurance tests in the 4-point running average.

(3) If the department identifies a deficiency, and after further investigation confirms it, correct that deficiency. If the contractor does not correct or fails to cooperate in resolving identified deficiencies, the engineer may suspend production until action is taken. Resolve disputes as specified in B.9.

B.9 Dispute Resolution

(1) The engineer and contractor should make every effort to avoid conflict. If a dispute between some aspect of the contractor's and the engineer's testing program does occur, seek a solution mutually agreeable to the project personnel. The department and contractor may review the data, examine data reduction and analysis methods, evaluate sampling and testing procedures, and perform additional testing. Use ASTM E 178 to evaluate potential statistically outlying data.

(2) If the project personnel can not resolve a dispute and the dispute affects payment or could result in incorporating nonconforming product, the department will use third party testing to resolve the dispute. The department's central office laboratory, or a mutually agreed on independent testing laboratory, will provide this testing. The engineer and contractor will abide by the results of the third party tests. The party in error will pay service charges incurred for testing by an independent laboratory. The department may use third party tests to evaluate the quality of questionable materials and determine the appropriate payment. The department may reject material or otherwise determine the final disposition of nonconforming material as specified in standard spec 106.5.

B.10 Acceptance

(1) The department will accept concrete pavement based on the contractor QC tests unless it is shown through the verification, or the dispute resolution process that the contractor's tests are in error.

C (Vacant)

D Measurement

(1) The department will measure Incentive Strength Concrete Pavement by the dollar, adjusted as specified in E.3.

E Payment

E.1 General

(1) The department will pay for measured quantities at the contract unit price under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
415.2000.S	Incentive Strength Concrete Pavement	DOL

E.2 QMP Testing

(1) Costs for all sampling, testing, and documentation required under this special provision are incidental to the work. If the contractor fails to perform the work required under this special provision, the department may reduce the contractor's pay. The department will administer pay reduction under the Non-performance of QMP administrative item.

E.3 Pay Adjustment for Strength

(1) The department will pay incentive for compressive strength under the following bid item:

ITEM NUMBER	DESCRIPTION	UNIT
415.2000.S	Incentive Strength Concrete Pavement	DOL

(2) Incentive payment is not limited, either up or down, to the amount the schedule of items show.

(3) The department will administer disincentives for compressive strength under the Disincentive Strength Concrete Pavement administrative item.

(4) The department will adjust pay for each lot using percent within limits (PWL) of the 28-day sublot average strengths for that lot. The department will measure PWL relative to the lower specification limit of 3700 psi. The department will not pay incentive for any quantity of concrete incorporated into the work with properties outside the control limits specified in subsection B of this special provision.

(5) Submit strength results to the department electronically using the MRS software. The department will validate all contractor data before determining pay adjustments.

(6) The department will adjust pay for each lot using equation "QMP 3.01" as follows:

PERCENT WITHIN LIMITS (PWL)	PAY ADJUSTMENT[1][2] (dollars per square yard)
≥95 to 100	(0.1 x PWL) – 9.5
≥85 to <95	0
≥30 to <85	(1.5/55 x PWL) – (127.5/55)
<30	-1.50

[1] The department will not pay incentive if the lot standard deviation is greater than 400 psi.

[2] For lots with less than 4 sublots, there is no incentive but the department will assess a disincentive based on the individual sublot average strengths. The department will reduce pay for sublots with an average strength below 3700 psi by $1.50 per square yard.

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